

# The Institutional Design and Effectiveness of Timber Benefit Sharing under Joint Forest Management in Madhya Pradesh, India

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**Abstract** This paper explores the institutional design of timber benefit sharing under the Joint Forest Management (JFM) policy and its effectiveness as an incentive for forest protection in Madhya Pradesh, India. Institutional analysis and case studies including household surveys for five committees were carried out. Except for plantations newly created under JFM, the places and times of timber harvesting were determined solely by the state forest department according to the division-level working plan. The sharing of the monetary benefits was determined by the state government and paid in equal amounts to committees in a lump sum, without taking the committees' differing degrees of performance into consideration. Except in one committee, only a few respondents knew about the benefit sharing. In a committee where the shared benefits had been paid, even though little collective action had taken place, the money was used without communal decisions. It was confirmed that benefit sharing from timber production in Madhya Pradesh had not been implemented with flexible calculation and payment systems based on local people's involvement in the decision-making process. Information provided by the concerned forest officers was the only way to motivate local people, and yet the appropriate information provisions were not likely to be in place. At the very least, improvements in the information provision with a change in the forest officers' perceptions and attitudes are desirable.

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## Introduction

In the last few decades, co-management of state forests by government agencies and local communities has been widely adopted in developing countries (Colfer 2005; Sunderlin et al. 2008), with an increasing recognition of the need for the people's cooperation in protecting and conserving forest resources. In co-management approaches, a set of incentives is generally offered so that the local people will be motivated to conduct forest protection and related activities (Meinzen-Dick and Knox 2001). Incentives may be broadly classified as direct and indirect (e.g. Salafsky and Wollenberg 2000; Abbot et al. 2001; Kerr et al. 2007). In the former, beneficiaries derive benefits from the utilization or the existence of forest resources directly, and therefore they need to maintain the resource basis from which they will obtain future benefits. Benefit sharing from forest products, ecotourism, or a system for payments for environmental services would be included. With indirect incentives, beneficiaries derive benefits from non-forestry activities, such as off-site income generation activities, improvement of agricultural productivity and village infrastructure development, which are not directly linked with the resource basis. Although indirect incentives can be effective, designing effective direct incentives through which conservation efforts by the local people are enhanced would be of the primary importance in a forest management project or program.

Benefit sharing from timber is a typical example of such direct incentives. In developing countries, forests are mostly state or public forests, and timber production is generally undertaken by government agencies or private companies holding leases or concessions. In such circumstances, if the rights to timber production, or at least part of timber benefits, are available to the communities, they can be a strong incentive by directly inducing the participants' effort to protect the forests until trees can be harvested. Despite such potential importance, benefit sharing from timber has not been sufficiently documented. In the Community Forestry program in Nepal, a community forest user group formulates an operational plan, and according to this plan, user group members can harvest timber from the existing natural forests (Dhakal and Masuda 2009; Chhetri et al. 2012). In Indonesia, under the Community Forest scheme, a community forest cooperative, which consists of several community forest committees, can undertake timber harvesting from plantation forests created under the scheme by obtaining a concession from the government, if the forestland on which trees are planted is a production forest (Ota 2011).

India is one of the countries where documentation of timber benefit sharing under co-management is lacking. Joint Forest Management (JFM), which has been implemented since the early 1990s and has covered 22.02 M ha as of 2006 (Ministry of Environment and Forests 2006), explicitly offers benefit sharing from timber. Benefit sharing is rooted in the origin of JFM in West Bengal. To cope with a situation where forest regeneration often failed due to local people's illicit felling and unregulated grazing, the then divisional forest officer promised a 25 % sharing of benefits from the revenue of harvested timber for the nearby villagers. This

arrangement is said to have had considerable success, and has been replicated across a number of other states (Kolavalli 1995; Balooni 2002).

Despite such explicit declarations and universality in the JFM institution, the design of timber benefit sharing in India has remained unclear. Behera and Engel (2006) reported on the lack of transparency, with special reference to Andhra Pradesh. The forest department carried out all harvesting activities, from logging to final sale, with little and sometimes no participation from the local communities, and the communities had no idea of the rate at which their products were sold and the amount of money received. Bhattacharya et al. (2008) pointed out that the local people, in general, have little knowledge about benefit-sharing arrangements, and forest departments rarely explain the formula used to calculate the shared benefits for participants. However, there has been no analysis of the official institutional design of timber production under JFM. Since the colonial period, India's forest administration has developed a management system based on *working plans*, with a plan prepared for each forest division stipulating the management and forestry operations, including timber production, for 10 years (Lal 2007). Little information is available on how this existing forest management and timber production system has been modified under JFM, and how JFM committees are involved in timber production. For an analysis of timber benefit sharing in a co-management approach, it would be necessary to explore whether the method of involving local organizations in timber production has been appropriate to give them a sense of ownership and responsibility.

The present study explores the institutional design of timber benefit sharing under JFM and its committee-level effectiveness as an incentive for forest protection. For the first objective, the authors set three specific topics which were considered to be most relevant, namely timber production under the working plan system, the extent to which JFM committees are involved in timber production, and how revenue from timber production is calculated and distributed to the committees. For the second objective, three topics were examined, namely to what extent committee members are aware of benefit-sharing arrangements, how many respondents consider that timber benefits were the primary expectation when JFM was started, and how the disbursed money is used within a committee. The first two of these are directly related to the participants' motivation; an incentive makes sense only when it is recognized by the beneficiaries. The last one is related to local governance. How to cope with the risk of inequitable benefit distribution or elite capture within a local organization is one of the most challenging issues in co-management (e.g. Iversen et al. 2006; Dhakal and Masuda 2009; Balooni et al. 2010; Saito-Jensen et al. 2010).

## The Study Site

The present study focused on the state of Madhya Pradesh. In India, benefit-sharing arrangements from timber production vary widely across states, and even within states, as indicated in "[Appendix](#)". The committees' share ranges widely, from 10 to 100 %. Some states even offer several patterns of sharing according to forest type, namely plantations or natural forests, teak (*Tectona grandis*) or species other than teak, degraded or dense forest, or the duration of management by committees.

Madhya Pradesh, which offers benefit sharing from both existing dense forests and plantations or rehabilitated degraded forests, was selected in order to cover various benefit-sharing patterns. This state also has the largest JFM area, of 5.95 M ha as of 2006, accounting for about one quarter of the total JFM area in India, and has the third largest ratio of JFM area to the total recorded forest area in the state (62.8 %), along with an early initiation year (1991) (Ministry of Environment and Forests 2006).

Until 2000, Madhya Pradesh and Chhattisgarh states had constituted one single state of Madhya Pradesh. After separation in 2000, the area of Madhya Pradesh became 308,252 km<sup>2</sup>. The total population as of 2001 was 75.70 M and the population density is approximately 250 persons/km<sup>2</sup> (Government of India 2011). The annual rainfall in the state ranges from 800 mm to 1,800 mm, and the eastern part lies in a dry deciduous forest range (Forest Survey of India 2009).

Since passage of the *Forest Conservation Act*, 1980, no felling operation has been permitted without the prior permission of the central government. In Madhya Pradesh, timber production has continued in several parts of the deciduous forest area. Permission is sought from the central government from year to year by submitting proposed harvest plans.

JFM was introduced in Madhya Pradesh in 1991, with the issue of the first JFM resolutions. The resolutions were amended in 1995, 2000 and 2001. The Madhya Pradesh Forestry Project, implemented during 1995–99 by the World Bank, contributed to the dissemination of JFM in this state. Only 848 committees had been created as of 1994, but at the end of the project in 1999, the number had increased to 11,872 (Vira 2005). After the project, the number of JFM committees continuously increased; as of 2006 there were 14,428 committees in the current Madhya Pradesh state and 7,820 in Chhattisgarh state (Ministry of Environment and Forests 2006).

Outside protected areas, there are two types of committee, namely Village Forest Committee (VFC) and Forest Protection Committee (FPC). The difference between these two is the quality of allocated forests; the former is for degraded forests and the latter is for dense forests. The committees' shares of timber benefits are fixed by state-level JFM resolutions, and the ratios have changed over time as indicated in Table 1. The expressions in the JFM resolutions are reported in “Appendix”.

The West Chhindwara Forest Division, in the dry deciduous forest part of Madhya Pradesh state, was further focused on to investigate the situations below the division level. This division was selected because timber production had been implemented since the colonial period. It also had a high proportion of JFM area to total forestland within the division, of 89.2 % as of 2007. Little development of plantation forestry has taken place, and timber production has mainly been carried out by selective logging of natural forests. The main species for timber are teak, sal (*Shorea robusta*), dhawada (*Anogeissus latifolia*), moyan (*Lannea coromandalica*), saja (*Terminalia tomentosa*), lendia (*Lagerstroemia parviflora*), dhaman (*Grewia tiliaefolia*), and garari (*Cleistanthus collinus*) (West Chhindwara Forest Division 2006).

## Research Method

For the analysis of institutional design, information was collected from state JFM resolutions, the present working plan of West Chhindwara Forest Division,

**Table 1** Types of JFM committee outside protected areas and their characteristics

Definition	Village Forest Committee (VFC)	Forest Protection Committee (FPC)
	For degraded forests (canopy cover less than 40 %)	For dense forests (canopy cover more than 40 %)
Share of timber benefits for committees (% and year)	30 % (1995)	None (1995)
	30 % (2000)	10 % from timber (2000)
	100 % (2001)	20 % from bamboo is added (2001)

Vira (2005)

micro-plans of JFM committees, other official documents, and interviews with divisional forest officers, sub-divisional forest officers, range officers and forest guards.

To collect committee-level information, case studies including direct household surveys were applied. As noted by Yin (2009), one of the advantages of a case study method is that it can effectively deal with *how* a program is implemented. The present study aimed to grasp the processes of benefit sharing and participants' perceptions at the local level, and hence committee-wise case studies are more appropriate than a large survey across committees, which may lack contextual information of each committee.

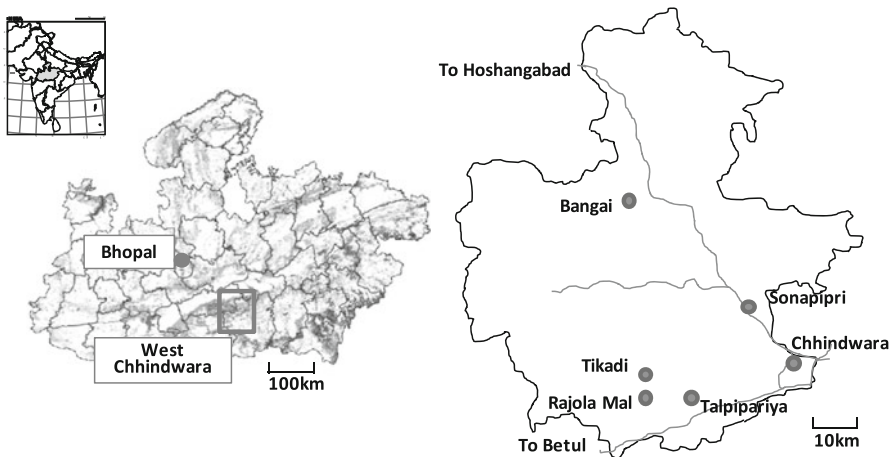
For data collection, both VFCs and FPCs were targeted to cover the benefit-sharing arrangements for both dense and rehabilitated degraded forests. Also, both World Bank-aided committees and others were targeted. Whether a committee had received external input had to be differentiated because several studies had pointed out that JFM was often implemented on a project basis and committees with no external aid were unlikely to be functioning substantively (Saigal et al. 2007; Bhattacharya et al. 2010).

There were 321 JFM committees in West Chhindwara as of 2010. The numbers of World Bank VFCs, World Bank FPCs, non-World Bank VFCs and non-World Bank FPCs were 38, 15, 130, and 138 respectively. Out of these four categories, a total of five committees, two World Bank VFCs (Talpipariya and Rajola Mal), one non-World Bank VFC (Sonapipri), one World Bank FPC (Tikadi), and one non-World Bank FPC (Bangai) were selected. Information on the demographic features, forest type, year of establishment, area, numbers of members and main livelihoods are presented in Table 2, and the locations are presented in Fig. 1. In Talpipariya and Rajola Mal, large bamboo plantations had been created through the World Bank project, and in Tikadi, timber operation had been carried out in 2007, and the money from shared benefits was disbursed in the fiscal year of 2009.

In each committee, the authors firstly confirmed the processes and contracts of benefit sharing with the president, forest watchers, or the concerned forest guard as the secretary. Next, a total of 40 households in each committee were randomly selected for household interviews. Respondents were asked about their knowledge and activities related to JFM, especially the benefit sharing. Fieldwork was carried out for Talpipariya, Sonapipri, Tikadi and Bangai between February and March 2010, and for Rajola Mal between February and March 2011. Information about Talpipariya was updated in 2011 through revisits.

**Table 2** Characteristics of the five selected committees

Characteristic	Talpipariya VFC	Rajola Mal VFC	Sonapipri VFC	Tikadi FPC	Bangai FPC
Administrative input	World Bank-aided	World Bank-aided	Not World Bank-aided	World Bank-aided	Not World Bank-aided
Year set-up	1996	1995	1995	1998	1999
Forest type	Teak	Mixed	Teak	Mixed	Mixed
Allocated forest area in ha (av. ha per household)	348.0 (3.6)	676.6 (5.0)	379.7 (3.0)	450.4 (8.5)	665.0 (5.7)
Number of member households	98	136	126	53	117
Demographic features	Non-tribal	Tribal	Tribal	Mixed	Tribal
Main livelihood	Agriculture	Wage labour	Wage labour	Wage labour	Wage labour
Ever received the money of shared benefits	No	No	No	Yes	No
Ever created plantations under JFM	Yes	Yes	No	No	No

**Fig. 1** Location of the state of Madhya Pradesh and West Chhindwara Forest Division, with locations of the five selected committees

## Results

### The Working Plan System

One of the essential features of a working plan is management based on zoning systems. As a rule, every state forest is classified into a particular category of function called a ‘working circle’, and proposed forestry operations or treatments

are implemented for each working circle. The kinds of working circles vary across India according to the ecological characteristics of forests, and even change within the same forest division with renewals of the working plan.

In the current working plan for West Chhindwara from 2006 to 2015, there are six types of working circles (Table 3): (1) Selection-cum-improvement, (2) Rehabilitation of degraded forest, (3) Protection, (4) Plantation, (5) Bamboo overlapping, and (6) Rehabilitation of degraded bamboo overlapping. Each working circle is territorially divided into a number of 'treatment series', and each treatment series consists of 20–30 small units called 'coupes'. Forestry operations are conducted in a rotation of one coupe for each treatment series every year. The main operations for each working circle and related information are summarized in Table 3. Timber and bamboo are harvested only in the coupes of the selection-cum-improvement working circles and the bamboo overlapping working circle respectively.

### Involvement of JFM Committees in Timber Production

In the current working plan of West Chhindwara, there is nothing written about the relationship between the working circle system and the JFM committees. In the 2001 resolutions, with regard to the VFC, it is stated that '100 % of the value of forest produce obtained from the plantation/rehabilitation of degraded forests/pasture development works done in the area/final felling of the planted area, after deducting the corresponding harvesting costs, would be made available to the committee'. With regard to the FPC, it is stated that '10 % of the value of forest produce obtained from final felling of timber coupes and 20 % of the value of forest produce obtained from the final felling of bamboo coupes, after deducting the corresponding harvesting costs, would be made available to the committee'.

**Table 3** Working circles in the current working plan (2006–15) of West Chhindwara Forest Division

Working circle	Area (ha)	Number of treatment series	Number of coupes	Main operation
Selection-cum-improvement	79,239	36	320	Selective timber felling
Rehabilitation of degraded forest	32,614	42	203	Illegally-felled stumps are cut back and dressed for appropriate coppicing Soil and water conservation works
Protection	44,257	28	192	Closure of the area
Plantation <sup>a</sup>	2,791	12	30	Plantation establishment
Bamboo overlapping	11,072	8	60	Selective bamboo felling
Rehabilitation of degraded bamboo overlapping	4,488	3	17	Cleaning and other operations for degraded bamboo clumps

<sup>a</sup> Plantations may be created outside the Plantation Working Circle if the range officer in charge decides that reforestation is needed for a particular place and the divisional forest officer approves it

However, from these sentences alone what the committee's role is in the existing working circle system is unclear.

The authors confirmed, by viewing committee-level micro-plans stored in Saori Range Office and Parasia Range Office, that for VFCs it was clearly stated that the committee will receive 30 % of the revenue from of timber production, although in some micro-plans, 30 % of *what* was not clearly stated: only '30 % of the production' was written. There was no explanation about the methods of harvesting and selling of the products and calculating the revenue. The time of harvest was also not mentioned. The formation of micro-plans was mostly confined to the committees targeted by the World Bank project from 1995 to 1999, while non-World Bank project committees had not prepared micro-plans. In addition, no micro-plans were identified for FPCs which were formed after the 2000 resolutions which started granting 10 % of timber benefits or 20 % of bamboo benefits. Thus, there were no explicit accounts in the relevant official documents about the relationship between the process of timber production and the JFM committees.

Other than in newly created plantations under the World Bank project, timber production – in natural and existing plantation forests, and in VFCs and FPCs—continued to be administered by the forest department following the working plan, including for forests that had been allocated to a JFM committee. The places and times of harvesting have been simply decided by the working circle system. If a selection-cum-improvement coupe in which timber is to be harvested is located inside the allocated forest, operations will be carried out, otherwise not. Committees are excluded from the decision-making process, and no modifications for JFM has been made to the existing working circle system. Selection-cum-improvement coupes are generally located in the dense forests allocated to FPCs. Most VFCs have degraded forests only, and hence benefit sharing for the VFCs is, in reality, confined to plantations newly created under the project.

Regarding the methods of harvesting under the working plan, generally a few people, typically forest watchers from the committee or somewhat educated persons, are hired for the tree marking before felling. For the felling work, members of the committee concerned are generally hired. Felled trees are numbered and recorded by the concerned forest officer.

After harvesting, the products are transported to the closest government depot and sold at auction. Auctions are held several times a year. The calculation of revenue is carried out at the state government level. These processes were managed by the state government only. After the felling work, committee members have nothing to do with the consequent process, and no scope has been offered for the committee members to hear about or monitor these processes.

Plantations newly created under JFM are not placed under the working circle system. In Talpipariya and Rajola Mal, large bamboo plantations were created under the World Bank project. These plantations are independent from existing working circles, and considered to be subject to harvest when the bamboo clumps are sufficiently mature. The clumps were being harvested at the time of visit in March 2011. However, in that forest officers in both committees suggested the harvesting, it would be appropriate to say that the primary decision-maker was the forest department.



## Calculation and Disbursement of the Timber Revenue

The 2001 resolutions state that calculation of the value of the harvested products would be made on the basis of the weighted average of the sale price of the products obtained in the concerned government sale depot during the calendar year. In the state government notification with regard to benefits to JFM committees issued in 2005 (No.F16/4/1991/10/2 dated Feb. 2005), the following instructions were given with regard to distribution of the profits: (1) out of the total committees' share, 80 % will be allocated for the committees which have a coupe where timber was harvested according to the working plan in each year, (2) the remaining 20 % will be allocated to all the committees for the purposes of training, preparation of micro-plans, awareness raising, advertising activities, or the maintenance of beat offices, (3) the use of the money should be communally decided through meetings, and (4) 25 % of the amount which a committee receives should be invested for forest development. What 'total' refers to is not specified in these instructions, but presumably means all committees located within the range of a sale depot.

From the data provided by the West Chhindwara Forest Division, it was discovered that the money was disbursed in equal amounts to the committees. In the fiscal year 2009, a total of 80 committees in West Chhindwara received the money from shared benefits from the felling operated in the fiscal year 2007; 8, 11 and 61 committees received Rs. 74,125, Rs. 1,810 and Rs. 47,949 respectively.<sup>1</sup> This fact means that how much has been accrued from which state forest does not affect the benefit sharing in this state; the money is disbursed to committees within the territory of a sale depot in a lump sum after calculations are made at the state government level.

With regard to the newly created plantations under the World Bank project, Talpipariya and Rajola Mal were the first cases of harvesting in this division, and there had been no evidence as to how the calculations of shared benefits had been made.

## Awareness of Benefit Sharing, Primary Expectations About JFM, and the Use of the Disbursed Money

Talpipariya has been one of the most successful cases in West Chhindwara; this committee received an award as best JFM committee in Madhya Pradesh in 2001. The committee members held tenders for collection rights of grass and mahua flowers (*Madhuca indica*) as collective activities. The percentage of the respondents who had ever attended meetings was high (87.5 %), as shown in Fig. 2. Rajola Mal also held tenders for collection of sugar-apple (*Annona squamosa*). The percentage

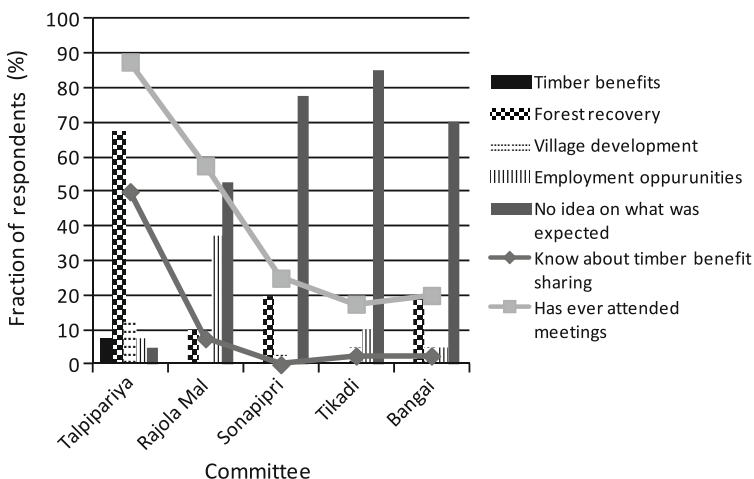
<sup>1</sup> It was not clear why there were three different amounts in the payment of shared benefits to the committees in 2009. The reason why as many as 80 committees received the payment, while the number of treatment series of the Selection-cum-improvement working circle is 36, meaning that timber harvesting is carried out in 36 places every year, was also not clear. With regard to the payment in years other than 2009, it was explained to the authors that this was the first time that money was disbursed in West Chhindwara because the costs had exceeded benefits in other fiscal years (interview with Sub-Divisional Forest Officer Parasia, 7 February 2011). However, in the East Chhindwara Forest Division, where the authors obtained the relevant data coincidentally, money had been constantly disbursed since 2001, except for in 2002 and 2003. However, the amounts were also equal across committees as in West Chhindwara.

of members who had ever attended meetings was moderate (57.5 %). However, Sonapipri, Tikadi and Bangai were typical ‘paper committees’ (Prasad and Kant 2003), which were just registered on paper with little guidance or facilitation for collective, and therefore are not functioning substantively. The committee members had never created any specific rules for forest use. The meeting attendance rates were low (25.0, 17.5, and 20.0 % respectively).

As shown in Fig. 2, few people knew about the benefit sharing, other than in Talpipariya, where 50 % of the respondents knew. No person, even the president and forest watchers, had knowledge in Sonapipri. In Tikadi, as the money had actually been transferred one year before the authors carried out the survey, one person knew about it; he was the forest watcher of the committee. In Bangai, a single person was undertaking the positions of both president and forest watcher, and hence only he had obtained information. In Rajola Mal, although this committee had succeeded in creating a large bamboo plantation, only 7.5 % of the respondents knew about the benefit sharing. In Rajola Mal, Sonapipri, Tikadi and Bangai, information was held only by the concerned forest guards and a few executive members and there was no information provision system for the general members.

What respondents expected most from JFM when the committee was formed is also shown in Fig. 2. Not surprisingly, in Sonapipri, Tikadi and Bangai, about 70–85 % answered ‘no idea’, meaning that little facilitation was made when the committee was formed. In Rajola Mal, the percentage of ‘no idea’ was also high (52.5 %). Only three people in Talpipariya answered that the revenue from timber production was the primary expectation for JFM, out of the sample 200 respondents.

With regard to the distribution of the disbursed money within a committee, in Tikadi the flow of the money was unclear. The forest watcher informally told the authors that a few people decided to purchase orange seedlings to distribute to the members, and the remaining money was used in an unclear way. Most people did not even know that money was provided to the committee. Only eight out of the 40



**Fig. 2** Respondents' answers on the knowledge of timber benefit sharing, attendance of meetings, and primary expectation for JFM when the committee was formed ( $n = 40$ )

sample respondents were given orange seedlings, but they did not understand why those seedlings were provided.

## Discussion

Several structural problems are apparent in the timber benefit sharing in Madhya Pradesh in terms of being a direct incentive for forest protection. Except for plantations newly created under the World Bank project, the traditional working circle system of the working plan had simply continued with no modification for committees. The places and times of harvesting have been determined by the working plan. In addition, the selling of products and the calculation of revenues were solely undertaken by the state government. Committees are structurally excluded from the decision-making process and any possible monitoring processes, and the activeness or will of a committee and the harvesting of timber had nothing to do with each other.

It was further discovered that the money from shared benefits was paid in equal amounts to committees. This fact infers that the forest department does not regard the JFM committees as different entities with differing degrees of performance. The efforts which various committees have made are considered in aggregate at the level of the relevant sale depot. Possible differences in performance in forest protection among committees cannot be taken into consideration with this payment method. The above two conditions being combined, a structure had been created that even though a committee may not be working substantively, timber harvesting is simply carried out if the allocated forest includes a selection-cum-improvement coupe, and the committee will automatically receive the same payment of shared benefits with other committees whose activeness or performance may be higher.

Such a non-performance-based method, where the forest department one-sidedly provides money, may be structurally ineffective because the local people can receive money even if they do nothing; free rider problems may arise. However, even though there are such structural problems, the benefit sharing might still function as an incentive if the local people receive information properly and are sufficiently motivated by it. However, in reality almost all respondents, except for those of Talpipariya, did not even know about the benefit sharing. It was evident that appropriate information provision is lacking in these committees, even though providing information is the only way to motivate the beneficiaries in the institutional structure of the benefit sharing.

An inequitable consequence of such automatic disbursement by the government was confirmed with the Tikadi case. This case implies that one-sided provision of benefits by the government without considering local situations would be not only ineffective in protecting forests, but also adverse for local governance.

As several studies have pointed out (e.g. Sundar et al. 2001; Prasad and Kant 2003; Enviro-Legal Defense Firm 2005; Vira 2005), it is likely true that there are many non-active committees in Madhya Pradesh. Hence, the situations the authors observed are probably common in other committees as well.

## Conclusions and Policy Implications

Timber benefit sharing in Madhya Pradesh does not appear to be an effective incentive for forest protection. The entire process is undertaken solely by the government as if it were merely an administrative obligation, with little intention to motivate local people. Although it should be acknowledged that other states in India do not necessarily face the same situation, the results presented in this paper offer several policy implications.

The existence and functioning of a rigid forest management system based on the working plan would be commendable in the context of developing countries and too drastic and irresponsible transformations of the established administration system may not be favorable, and yet ideally speaking, at least committee members should have been involved in some monitoring process of the harvested timber. Considering the harvested trees are numbered and recorded by forest officers in each forest, it might be possible to create a space in which committee members can monitor and trace the timber revenue from their forest. With such a monitoring and tracing system, committee-wise calculations of the revenue, which would be more responsive to local situations, might be possible. However, due to high transaction costs, this has not been achieved, and would probably be difficult to implement in the future.

Improvements in information provision can probably be implemented more easily. The authors argue that insufficient facilitation of the frontline forest officers within the organization of the forest department, and accordingly insufficient 'downward accountability' (Ribot et al. 2010) of the forest guards toward committee members, are the most fundamental causes of the problems. Forest departments in India are highly bureaucratic and hierarchic (Kumar and Kant 2005), and the attitudes or ways of thinking of the frontline officers are determined primarily by the orders or instructions from their senior staff. Situations where a forest guard does not provide information properly, or communicates with local people in a domineering manner, may arise because he was not properly instructed by the senior staff about the concept of joint management, or the senior staff themselves had the same attitude and way of thinking. Hence, transformations in the perceptions and attitudes of forest officers are recommended to create a more effective system of providing information to the local people. For this purpose, training programs may be provided to enhance the skills of social facilitation or communication, not only for the frontline forest guards, but also at least for the range officers. This implication, that enhancing the facilitation skills of officers in charge would be the first step towards making incentives under co-management approaches work or more effective, may be broadly applied beyond the context of benefit sharing from timber production in India.

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## Appendix

See Table 4.

**Table 4** Committee's shares and specifications in benefit sharing from timber across the Indian states where JFM is implemented

Committees' share (%)	State and resources	Official statements	Reference
100	<p>Andhra Pradesh</p> <p>Natural forests</p> <p>Non-teak plantations where period of management by committees is more than half of the plantation age</p> <p>Assam</p> <p>Plantations raised by committees</p> <p>Himachal Pradesh</p> <p>Plantations</p> <p>Madhya Pradesh</p> <p>From degraded forests, including plantations</p> <p>Orissa</p> <p>The first main felling in the woodlots which were raised under the SIDA Social Forestry Project</p>	<p>All timber and bamboo (including yield from bamboo plantations) harvested from the forest managed by them except in case of plantations</p> <p>In case of other plantations, whose age is known, 50 % of harvest (including thinning) of the period of management of plantation by Vana Samrakshana Samithi is less than 50 % of the rotation period and 100 % of volume harvested is such period of management by the Vana Samrakshana Samithi is more than 50 % of rotation period of the plantation</p> <p>Full share in the harvest of timber in plantations raised by JFMC</p> <p>Grant of 100 % income from plantations to the VFDSs and Panchayats</p> <p>100 % of the value of forest produce obtained from the plantation/rehabilitation of degraded forests/pasture development works done in the area/ final felling of the planted area, after deducting the corresponding harvesting costs, would be made available to the committee</p> <p>VSS shall be entitled to 100 % of the usufructs in the final harvest of the plantation while they will be entitled for 50 % of the share as usual during subsequent rotations</p>	<p>G. O. MS. No. 13 Dt.: 12-02-2004 (<a href="http://forest.ap.nic.in/JFM%20CFM/GO13-2004.htm">http://forest.ap.nic.in/JFM%20CFM/GO13-2004.htm</a>)</p> <p>Forest department's homepage (<a href="http://assamforest.in/jfm/jfm_main.php">http://assamforest.in/jfm/jfm_main.php</a>)</p> <p>No. Fts. II (B) 15- 10/87. (<a href="http://hpforest.nic.in/for_mgt.htm">http://hpforest.nic.in/for_mgt.htm</a>)</p> <p>F16/491/10-2 dated 22-10-01 (not available on the internet as of 29 March 2011)</p> <p>No. IF- Affn. 17/2008- 17454 /FandE (<a href="http://www.ortssa.gov.in/forestandenvironment/Forest_resolution/pdf/17454_22.10.08.pdf">http://www.ortssa.gov.in/forestandenvironment/Forest_resolution/pdf/17454_22.10.08.pdf</a>)</p>

Table 4 continued

Committees' share (%)	State and resources	Official statements	Reference
90	Jharkhand	90 % of the benefits from forest products will be given to committees (original in Hindi)	05/2000-3658 V.P., Ranchi, Date: 27 Sep 2001 ( <a href="http://www.jharkhandforest.com/files/sanyukt20Van%20Prabbandhan.pdf">http://www.jharkhandforest.com/files/sanyukt20Van%20Prabbandhan.pdf</a> )
	Rajasthan	After the expenditures for the planting, protection, and management of plantations which were carried out by committees are provided by the forest department, 90 % of the benefits from the auction of final felling of bamboo and the wood which girth is more than 20 cm will be given to committees and the remaining 10 % will be given to the forest department (original in Hindi)	No. F7(39) Forest/90/ ( <a href="http://www.rajforest.nic.in/pdf/JFMcircular.pdf">http://www.rajforest.nic.in/pdf/JFMcircular.pdf</a> )
75	Karnataka	75 % to VFC	GO No. FEE 50 FAP 2000 dated: 19/6/2002 ( <a href="http://www.karnatakaforest.gov.in/english/joinedforest_management/jfpm_scheme.htm">http://www.karnatakaforest.gov.in/english/joinedforest_management/jfpm_scheme.htm</a> )
50	Andhra Pradesh	In case of other plantations, whose age is known, 50 % of harvest (including thinning) of the period of management of plantation by Vana Samrakshana Samithi is less than 50 % of the rotation period and 100 % of volume harvested is such period of management by the Vana Samrakshana Samithi is more than 50 % of rotation period of the plantation	G. O. MS. No. 13 Dt.: 12-02-2004 ( <a href="http://forest.ap.nic.in/JFM%20CFM/GO13-2004.htm">http://forest.ap.nic.in/JFM%20CFM/GO13-2004.htm</a> )
	Gujarat	50 % sharing of net at final harvest	Forest department's homepage ( <a href="http://gujenvfor.gswan.gov.in/e-citizen/joint-forest-management/e-citizen-Jointforest-manage-saitenfeature.htm">http://gujenvfor.gswan.gov.in/e-citizen/joint-forest-management/e-citizen-Jointforest-manage-saitenfeature.htm</a> )

**Table 4** continued

Committees' share (%)	State and resources	Official statements	Reference
	Karnataka	50 % to VFC	GO No. FEE 50 FAP 2000 dated: 19/6/2002 ( <a href="http://www.karnatakaforest.gov.in/english/joinedforest_management/jfm_scheme.htm">http://www.karnatakaforest.gov.in/english/joinedforest_management/jfm_scheme.htm</a> )
	Assets created prior to the formation of committees (older fuel wood, fodder and small timber plantations, etc, excluding teak plantations)		
	Natural forests prior to the formation of committees excluding valuable species such as Sandalwood, Rosewood, Teak, Honne, Matti, or Nandi which are subjected to the working plan prescriptions		
	Maharashtra	Up to 20 % of the net revenue thus obtained from dense forests and 50 % of the output from the degraded forests will be earmarked for the concerned F.P.Cs	Forest department's homepage ( <a href="http://www.mahaforest.nic.in/">http://www.mahaforest.nic.in/</a> )
	Degraded forests	The VSS will be entitled to 50 % share of the sale price after deduction of proportionate harvesting cost and this will be deposited in their 'VSS account	No.IF-Affn.17/2008- 17454 /FandE ( <a href="http://www.orissa.gov.in/forestandenvironment/Forest_resolution/pdf/17454_22.10.08.pdf">http://www.orissa.gov.in/forestandenvironment/Forest_resolution/pdf/17454_22.10.08.pdf</a> )
	Orissa		
	General cases	After providing all the expenditures for the protection and management of plantations, 50 % of the benefits from the auction of final harvest of grass and the wood which girth is more than 20 cm will be given to the forest department and the remaining 50 % will be given to committees. (original in Hindi)	No.F7 (39) forest/90/ ( <a href="http://www.rajforest.nic.in/pdf/JFMcircular-pdf">http://www.rajforest.nic.in/pdf/JFMcircular-pdf</a> )
	Rajasthan		
	Grass and wood in plantations	JFM committees are also entitled to 50 per cent of the profits from the sale of timber crops	Forest department's homepage ( <a href="http://www.tripuraforest.in/achi1.htm">http://www.tripuraforest.in/achi1.htm</a> )
30	Tripura	The Societies are entitled to 30 % of the funds to be generated after selling the trees	Forest department's homepage ( <a href="http://haryanaforest.gov.in/Functions/JointForestManagement2.aspx">http://haryanaforest.gov.in/Functions/JointForestManagement2.aspx</a> )
	Haryana		

Table 4 continued

Committees' share (%)	State and resources	Official statements	Reference
25	Kerala Other than plantations  Punjab	25 % of the net revenue of the forest produce from other forests within the PFM area as per approved Microplan  In case of produce like timber, bamboo, khair etc. 25 % of the revenue obtained by the Punjab Forest Department from auctions/ transfer of lots to Punjab State Forest Development Corporation Ltd. shall be retained by the forest department and given to the FPC as its share in lieu of protection/ assistance in management of assigned forest area  Members of the JFMC will receive 25 % of net sale proceeds of firewood and poles, which are harvested during coppice felling coupes operations, thinning and cultural operations	G.O.(Ms) 84/97/FandWLD ( <a href="http://www.keralaforest.org/index.php?option=com_docman&amp;task=doc_detail&amp;id=4&amp;Itemid=185">http://www.keralaforest.org/index.php?option=com_docman&amp;task=doc_detail&amp;id=4&amp;Itemid=185</a> )  No. 46/242/99-Fr.III/18759 ( <a href="http://www.pbforests.gov.in/Pdfs/JFM%20Notification.pdf">http://www.pbforests.gov.in/Pdfs/JFM%20Notification.pdf</a> )          5969 For Dt. 03.10.2008 ( <a href="http://www.westbengalforest.gov.in/update_06-080-09/5969_For_Dt._03.10.2008.pdf">http://www.westbengalforest.gov.in/update_06-080-09/5969_For_Dt._03.10.2008.pdf</a> )  5970 For Dt. 03.10.2008 ( <a href="http://www.westbengalforest.gov.in/update_06-080-09/5970_For_Dt._03.10.2008.pdf">http://www.westbengalforest.gov.in/update_06-080-09/5970_For_Dt._03.10.2008.pdf</a> )  5971 For Dt. 03.10.2008 ( <a href="http://www.westbengalforest.gov.in/update_06-080-09/5971_For_Dt._03.10.2008.pdf">http://www.westbengalforest.gov.in/update_06-080-09/5971_For_Dt._03.10.2008.pdf</a> )
20	Madhya Pradesh Bamboo from good forests	10 % of the value of forest produce obtained from final felling of timber coupes and 20 % of the value of forest produce obtained from the final felling of bamboo coupes, after deducting the corresponding harvesting costs, would be made available to the committee	F16/491/10-2 dated 22-10-01 (not available on the internet as of 29 March 2011)



Table 4 continued

Committees' share (%)	State and resources	Official statements	Reference
15	Maharashtra Dense forests	Up to 20 % of the net revenue thus obtained from dense forests and 50 % of the output from the degraded forests will be earmarked for the concerned F.P.Cs	Forest department's homepage ( <a href="http://www.mahaforest.nic.in/">http://www.mahaforest.nic.in/</a> )
	Rajasthan Plantations of bamboo or wood not raised by committees	If only protection work is carried out by committees, only 20 % of the benefits from the auction of final felling of bamboo and the wood which girth is more than 20 cm will be given to committees and the remaining 80 % will be given to the forest department (original in Hindi)	No.F7 (39) forest/90/ ( <a href="http://www.rajforest.nic.in/pdf/JFMCircular.pdf">http://www.rajforest.nic.in/pdf/JFMCircular.pdf</a> )
	Chhattisgarh	For any main felling in Bamboo/Timber Coup/ Silviculture Thinning as per working plan prescriptions in the area allotted to JFMC; the JFMC would be entitled to receive 15 % cash benefit of the total sale price of forest produce or the forest produce equivalent to that amount  Members of the JFMC will receive 15 % of net sale proceeds of timber, which are harvested at the time of final felling	Forest department's homepage ( <a href="http://forest.cg.gov.in/fm.htm">http://forest.cg.gov.in/fm.htm</a> )
10	West Bengal (only for Nadia, Murshidabad, Malda, Uttar Dinajpur, Dakshin Dinajpur, areas of north Bengal plains, and Darjeeling Gorkha Hill Council areas) Timber		5969 For Dt. 03.10.2008 ( <a href="http://www.westbengalforest.gov.in/update_06-080-09/5969_For_Dt_03.10.2008.pdf">http://www.westbengalforest.gov.in/update_06-080-09/5969_For_Dt_03.10.2008.pdf</a> )
	Kerala Plantations	The VSS will be entitled to 10 % of the net revenue of the harvested forest produce from the plantation raised and protected by VSS under PFM	5970 For Dt. 03.10.2008 ( <a href="http://www.westbengalforest.gov.in/update_06-080-09/5970_For_Dt_03.10.2008.pdf">http://www.westbengalforest.gov.in/update_06-080-09/5970_For_Dt_03.10.2008.pdf</a> )
	Madhya Pradesh Timber from good forests	10 % of the value of forest produce obtained from final felling of timber coupes and 20 % of the value of forest produce obtained from the final felling of bamboo coupes, after deducting the corresponding harvesting costs, would be made available to the committee	G.O.(Ms) 84/97/FandWLD ( <a href="http://www.keralaforest.org/index.php?option=com_docman&amp;task=doc_details&amp;gid=4&amp;Itemid=185">http://www.keralaforest.org/index.php?option=com_docman&amp;task=doc_details&amp;gid=4&amp;Itemid=185</a> )  F16/49/1/10-2 dated 22-10-01 (not available on the internet as of 29 March 2011)

**Table 4** continued

Committees' share (%)	State and resources	Official statements	Reference
According to the length of management by committees	Andhra Pradesh Teak plantations	In case of teak plantations within VSS area, whose age is known, twice the proportionate yield harvested (including yield from thinning) with reference to age of the plantation and the period of maintenance by the Vana Samrakshana Samithi (maximum entitlement will not however exceed the total yield of the plantations)	G. O. MS. No. 13 Dt.: 12-02-2004 ( <a href="http://forest.ap.nic.in/JFM%20CFM/GO13-2004.htm">http://forest.ap.nic.in/JFM%20CFM/GO13-2004.htm</a> )
	Assam High forests	Share in proportion to period of management in high forests managed by JFMC	

Except for Madhya Pradesh, where fieldwork was carried out, the authors confirmed the latest information by browsing the homepages of each forest department. The date of access to the websites is 29 March 2011

Expressions in official documents are presented, to minimize the risk of misinterpretation. In cases where the resolutions or notifications had been uploaded on the website, the authors directly cited the relevant sentences with the number of the government order and the link to the download page. In cases where only summarized explanations on the homepage were found, with no information on the number of the government order in force, the uploaded sentences with the link to the webpage are provided

Arunachal Pradesh, Bihar, Goa, Jammu Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, Uttar Pradesh, and Uttarakhand did not provide relevant information on their websites; hence these states are excluded from the list

Vana Samrakshana Samithi or VSS is Forest Protection Committee; VFDS is Village Forest Development Societies; SIDA is Swedish International Development Agency

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